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# (54) Peelable food casing and method of preparing same

(57) This invention concerns tubular cellulosic food casings having a coating comprising a water dispersible saturated fatty acid ester or salt over the internal surface thereof and to methods of making such casings.

The casings of the present invention exhibit improved peeling characteristics from food products encased and processed therein.

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SPECIFICATION

**Peelable food casing and method of preparing sam**

The present invention relates to improved food casings, and particularly to cellulosic food casings that are suitable for encasing and processing food products, and more particularly to casings that may be readily removed from about the processed food products, and to methods of making such casings.

Food casings used in the processed food industry are generally thin-walled tubing of various diameters prepared from regenerated cellulose, cellulose derivatives, alginates, collagen and the like. Fibrous webs may also be embedded in these food casings and such casings are commonly referred to in the art as "fibrous food casings". In general, these casings have multifunctional uses in that they may be employed as containers during the processing of the food product encased therein, and also serve as a protective wrapping for the finished product. In the sausage meat industry, however, the preparation of various types of sausages, ranging in size from smaller sausages such as frankfurters up to the larger sizes such as bolognas, usually involves removing the casing from about the processed meat prior to final packaging. Peeling the casing from the processed sausage has presented major problems, particularly in the production of frankfurters where large numbers of the product are involved and where the desire in commercial operations is to use more severe than normal processing conditions for increased productivity, and to use high-speed, automatic stuffing and peeling machines.

When the casing is removed from the meat mass, there is occasionally a tendency for some meat to adhere to the casing and be torn from the sausage with the casing, thereby causing surface marring of the sausage. In other instances, variations in the meat emulsion formulations or in the processing conditions, such as the use of severe conditions including higher than normal processing temperatures and lower than normal humidity, can result in a degree of adherence of the casing to the product which hinders rapid removal of the casing from the product encased therein. The use of high-speed, automatic peeling machines in commercial operations as, for example, disclosed in U.S. Patent Nos. 2,424,346 to Wilcoxon, 2,514,660 to McClure et al., 2,686,927 to Greg, and 2,757,409 to Parkers et al., makes it particularly essential that there be minimal resistance to the separation of casing from sausage, or the product will jam at the peeler or go through unpeeled. Less than complete removal of the casing necessitates the expense of hand sorting and peeling.

Heretofore many attempts have been made to provide casings having easy release characteristics. It is known in the art, as disclosed, for example, in U.S. Patent Nos. 2,901,358 to Underwood et al., 3,106,471 and 3,158,492 to Firth, 3,307,956 to Chiu et al., 3,442,663 to Turbak, 3,558,331 to Tarika, 3,818,947 to Rose, and 3,898,348 to Chiu et al., that the application of certain types of coatings to the inside wall of the food casings may afford improvement in the release characteristics of the casing from the encased sausage product. To the best of our knowledge, however, none of the coatings disclosed in the art is completely satisfactory for use with all types of meat emulsion formulations and commercial processing conditions, particularly when more severe than normal processing conditions are employed and when high-speed, automatic commercial peeling equipment is employed. Further, food casings which are generally utilized to obtain food products such as vienna sausage, frankfurters and the like, are typically fabricated in continuous lengths measuring from about 55 feet to 160 feet and longer in length, and from about 7/8 inch to 2 1/2 inches or more in flat width, which are formed into shirred casing sticks. It has been found that some coatings as, for example, disclosed in U.S. Patent No. 3,451,827 to Bridgeford, when applied to the inside surface of the food casing, interfere with mechanical shirring of the casing or the mechanical stuffing of shirred casing that has been coated on its internal surface prior to or during the shirring operation.

By practice of the present invention there may be provided one or more of the following:—

(i) a tubular food casing that is suitable for the encasing and processing of food products and is readily released from the processed food product encased therein,

(ii) a tubular food casing, and the methods of producing the same, that is suitable for the processing of sausage products from various types of meat emulsion formulations under conventional and more severe than normal processing conditions, and that is readily released from the sausage processed ther in by the use of high-speed automatic sausage peeling machines,

(iii) a shirred tubular food casing, and the methods of producing the same, that is suitable for the processing of sausage products and is readily released from the sausage processed therein by the use of high-speed, automatic sausage peeling machines.

According to the present invention there is provided a tubular cellulosic food casing having a coating over th internal surface thereof, said coating comprising as an essential ingredient a water dispersible saturated fatty acid ester or salt.

The term "dispersible" is meant to encompass emulsions, and suspensions and the like.

While the essential class of materials suitable for use in the practice of this invention is referred to as "water dispersible", because the materials have the common characteristic of being dispersible in water, it is not critical that water always be present in a coating composition containing a "water dispersible" saturated fatty acid ester or salt. However, as will be more fully disclosed in detail hereinafter, a preferred embodiment of this invention does contemplate the use of water as a component of the coating composition.

In a preferred embodiment, the coating cmprises an admixture of at least thee components, one of said components being a water dispersible saturated fatty acid ester or salt, a second component being water and a third component being a humectant such as the following polyols or mixtures thereof: glycerol, propylene glycol, triethylene glycol, sorbitol, and the like.

In a more preferred embodiment the coating also comprises a lubricant as a fourth component such as an animal fat, a vegetable oil, a mineral oil, a silicone oil, and the like, or mixtures thereof.

The preferred methods of applying the coating to the casing contemplate first forming an admixture, preferably a dispersion, of the water dispersible saturated fatty acid ester or salt in an admixture also comprising water, the humectant, and if desired, the lubricant.

There are several reasons for admixing water and a humectant with the water dispersible saturated fatty acid ester or salt to form the coating admixture, among which are viscosity control of the coating admixture, ease of application of the coating, better control of the amount of the water dispersible saturated fatty acid ester or salt coated on the casing, and the practicality of also moisturizing the casing during a conventional shirring operation by applying to the interior of the casing stock prior to shirring, water and sufficient humectant to retard excessive imbibition of water by the casing as more fully set forth in U.S. Patent 3,981,046 to Chiu.

Addition of a lubricant to the coating admixture applied to the casings of this invention is not critical to the practice of this invention, but is preferable since it does provide an enhanced ability to shirr the casings without unwanted jamming of the casings on the shirring apparatus. The concentration of the lubricant in the coating admixture and the amount of the lubricant applied to the casing surface can be easily determined by those skilled in the art, but preferably the lubricant should be present in an amount of no more than about 6 mg. lubricant per square inch (0.93 mg/cm$^2$) of internal casing surface (1.0 in$^2$ is equivalent to 6.45 cm$^2$).

Casing produced in accordance with the practice of the present invention can be utilized in the preparation of food products from a wide range of formulations and processing conditions including more severe than normal processing conditions, and then can be readily removed from the processed food product using high-speed-automatic peeling machines, without scarring or scuffing the surface thereof and with high peeling efficiency.

The food casings of the present invention may be prepared from tubular casings, particularly casings of regenerated cellulose and fiber reinforced regenerated cellulose, that are fabricated in accordance with any of the known commercial methods by applying a coating composition to the internal surface thereof, said coating composition containing a component or components which will be more fully described hereinafter.

An essential component of the coating suitable for use in accordance with the practice of the present invention can be generally designated as a water dispersible saturated fatty acid ester or salt.

Typical water dispersible saturated fatty acid esters, and mixtures thereof, which may be employed are those which are waxy in their natural state at room temperature and which melt in the range of about 30 to about 70°C, such as, for example, ethoxylated glycerol monostearate, propylene glycol monostearate, glycerol monolaurate, triglycerol monostearate, polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan tristearate, glycerol monostearate, succinylated glycerol monostearate, sorbitan monopalmitate, sorbitan monostearate, and the like. Also suitable for use in the present invention are dispersible saturated fatty acid salts, and mixtures thereof, such as, for example, sodium stearate, sodium palmitate, potassium stearate, and the like.

The amount of a water dispersible saturated fatty acid ester or salt present on the internal surface of the food casing, which is necessary to impart desired release characteristics, can vary over a wide range though very small quantities are actually required. In general, tubular casings of the present invention will contain at least about 0.04 milligram of the water dispersible saturated fatty acid ester or salt per square inch (0.0062 mg/cm$^2$) of casing surface and preferably between about 0.06 mg/in$^2$ and about 0.40 mg/in$^2$ of said water dispersible saturated fatty acid ester or salt. Especially preferred are casings having a coating on the internal surface thereof of between about 0.06 mg/in$^2$ and about 0.25 mg/in$^2$ of said water dispersible saturated fatty acid ester or salt. Greater amounts of the water dispersible saturated fatty acid ester or salt component may be used, if desired, although generally it will not materially improve the release characteristics of the casing, and with certain types of meat formulations or processing conditions, meat emulsi n breaks down and fat separation may be encountered.

One of the most extensive commercial uses for tubular food casings is in the preparation of smaller sausages such as frankfurters, wherein the casing is generally used in the form of shirred casing sticks. Typical methods and apparatus employed in the shirring of lengths of tubular casing to obtain shirred casing sticks are disclosed, for example, in U. S. Patents Nos. 2,984,574 to Matecki and 3,110,058 to Marbach.

Application of the water dispersible saturated fatty acid ester or salt coating to the internal casing surface can be accomplished by using any one of a number of well known methods. Thus, for exampl , a coating composition containing the water dispersible saturated fatty acid ester or salt can be introduced into the casing in the form of a "slug" of liquid, and advancing the casing past the liquid slug coats the inner surface thereof. A preferable method is application by spraying of a dispersion of the water dispersible saturated fatty acid ester or salt to the internal surface of the casing through a hollow mandrel over which the casing is advancing, such as, for example, the mandrel of a casing shirring machine in a manner similar to that described in U. S. Patent No. 3,451,827 to Bridgeford.

It has been found that dispersions, rather than melts, of the water dispersible saturated fatty acid ester or salt are most suitable and preferred as a coating composition for preparation of tubular casings of the present invention, affording a clear and uniform coating of the water dispersible saturated fatty acid ester or salt, and affording greater control of the required small amounts of the water dispersible saturated fatty acid ester or salt and other coating components which are applied over the internal surface of the casing.

However, application of a coating composition containing the water dispersible saturated fatty acid ester or salt in a non-aqueous solution would also be satisfactory for preparing casings used for certain applications.

Coating compositions suitable for use in accordance with the practice of the present invention are dispersions such as emulsions, or suspensions, and the like containing at least about 1.0% by weight of the water dispersible saturated fatty acid ester or salt. The concentration of the water dispersible saturated fatty acid ester or salt in the coating composition depends primarily on the method of application to be employed and the viscosity of the composition. Coating compositions exhibiting viscosity properties up to about 8000 cps at the temperature of application have been found to be satisfactory. However, a viscosity up to about 5000 cps is most suitable and preferred.

Particularly suitable coating compositions also contain between about 10% and about 90% by weight of a humectant such as a polyol having from three to six carbon atoms and at least two hydroxyl groups. Preferably, the coating compositions will contain between about 40% and about 60% by weight of humectant. Typical polyols that can be employed are glycerol, propylene glycol, triethylene glycol and sorbitol. Mixtures of the polyols may also be used as the humectant. The amount of polyol that may be used is, in general, dependent on the desired viscosity of the coating composition and also on the amount of water that may be tolerated by the tubular casings being treated, as hereinafter discussed more fully.

Cellulosic casing, as manufactured, contains a substantial quantity of glycerine (glycerol) which is a good humectant and suitable for use in the practice of the embodiments of this invention. This glycerol is already present in the casing by reason of its use as a plasticizer during manufacture of the casing. However, if it is desired to moisturize the casing with water during a conventional shirring operation additional humectant is required in a coating admixture containing the water which is applied to the casing (U. S. Patent 3,981,046 to Chiu).

Cellulosic casing of this invention contains a total humectant content, after application of the coating composition containing the water dispersible saturated fatty acid ester or salt, of from about 15 to about 30 weight per cent humectant based on the total weight of the casing together with the coating. The cellulosic casing of this invention also has a total water content of from about 3 to about 35 weight per cent water, based on the total weight of the casing together with the coating. In particular, a non-fiber reinforced cellulosic casing suitable for processing frankfurters has a total water content of from about 14 to about 20 weight per cent water, based on the total weight of the casing together with the coating.

A number of factors are known to affect the preparation of shirred casing sticks and the suitability of the shirred casing sticks for use in the processing of various types of food products, particularly when high speed automatic equipment is employed in the shirring and stuffing operations. It is well known in the art, for example, that if the moisture content of cellulose casing for frankfurters is greater than about 20% by weight, difficulty is experienced in formation of proper pleat and shirring patterns, and "bowing and snaking" of the resulting shirred casing stick will occur, thereby making stuffing operations more difficult. Further, it has been found that when water is applied to the casing during the shirring process, application of excess amounts of water will caus the casing to seize on the shirring mandrel thereby making further processing th reof very difficult, if not impossible. On the other hand fiber r inforced cellulose casing may be shirred at moisture levels of about 35% by weight or higher befor difficulties may be encountered.

Accordingly, when it is desired to apply the coating compositions described herein, as, for example, while the tubular casing is passing over a shirring mandrel prior to or during the shirring operation, it has been found that the amount of coating composition applied while treating the internal surface of the casing with a water dispersible saturated fatty acid ester or salt must be controlled to limit the amount of water added to the casing. It is also particularly advantageous to avoid application of more coating composition than can be imbibed by the casing, in order to prevent excess coating composition from being lost and wasted, or from accumulating in localized areas of the shirred sticks with resulting detrimental effects thereto. Generally, not more than about 7.0 mg/in$^2$ and preferably not more than about 5.0 mg/in$^2$ of coating composition containing at least about 1.0% by weight of the water dispersible saturated fatty acid ester or salt should be applied to the internal surface of the tubular casing. The application of said coating composition must be further controlled so that less than about 2.8 mg/in$^2$, and preferably less than about 1.6 mg/in$^2$, of water is applied to the surface of the casing, while applying at least about 0.04 mg/in$^2$, and preferably between about 0.06 mg/in$^2$ and about 0.40 mg/in$^2$, of the water dispersible saturated fatty acid ester or salt to the internal surface thereof.

The amount of water and other ingredients applied to the surface of the tubular casing may, of course, be controlled by varying the amount of coating composition applied and/or the concentration of the water dispersible saturated fatty acid ester or salt in the coating composition. It has been found, however, that a particular advantageous means for controlling the amount of water applied to the casing, while providing for desired variations in the amount of the water dispersible saturated fatty acid ester or salt concentrations and variations in the viscosity of the coating compositions, is afforded by using certain proportions of the polyols hereinabove described in the preparation of such aqueous coating compositions. Aqueous dispersions of the water dispersible saturated fatty acid ester or salt as coating compositions, wherein said polyol is present in a ratio by weight of polyol to water of at least about 0.15 to 1.0, and preferably in a weight ratio that ranges between about 0.4 to 1.0 and about 2.5 to 1.0, are particularly suitable for use in the preparation of the tubular cellulosic casings of the present invention.

The present invention will now be further described by way of the following examples which are set forth as being merely illustrative of the invention and which are not intended, in any manner, to be limitative thereof. Unless otherwise indicated, all parts and percentages are by weight.

*EXAMPLES I–XX*

These examples illustrate that a water dispersible saturated fatty acid ester or salt in admixture with propylene glycol and water is suitable for providing a food casing which is easily peeled from a food product processed therein. These examples also illustrate that water soluble or non-dispersible saturated fatty acid esters are unsuitable, and that unsaturated fatty acid esters are also unsuitable.

Coating compositions are prepared from several fatty acid esters or salts as indicated in Table 1 below, using the following proportions of ingredients:

| | |
|---|---|
| Fatty acid ester or salt | 3 wt% |
| Propylene glycol | 48.5 wt% |
| Water | 48.5 wt% |

Comercially produced cellulosic casing samples 55 feet long having a flat width of about 1.3 inches are used to prepare the casings of these examples. These casings are shirred on an apparatus such as that disclosed in U. S. Patent No. 3,110,058 to Marbach. As each 55 foot length of casing is shirred, the particular coating composition is applied, in the amounts, as indicated in Table 1 below, of total coating composition per square inch of internal surface of casing, by metering through the shirring mandrel along with the stream of inflation air.

The amounts of fatty acid ester or salt appli d to each f the casings of these examples are also indicated in Table 1.

A frankfurter type meat emulsion prepared from a formulation containing the following ingredients is stuffed into the shirred lengths of casing and linked into frankfurters by conventional linking apparatus.

| | |
|---|---|
| Boneless Beef Chucks | 100 lbs. |
| Regular Pork Trimmings | 60 lbs. |
| Boneless Beef Flank | 40 lbs. |
| Ice/$H_2O$ | 50 lbs. |
| Salt | 5 lbs. |
| White Pepper | 10 oz. |
| Prague Powder | 8 oz. |
| Coriander | 4 oz. |
| Mace | 2 oz. |
| Sodium Erythorbate | 2 oz. |
| Garlic | 1 oz. |

There are no difficulties, such as undesired casing sticking or breakage, encountered during the shirring of the casing and during the stuffing and linking of any of the casings of these Examples. The stuffed casings are all processed in a smokehouse using a processing cycle known to adversely affect the peelability of casings from encased food products. The processing cycle used comprises acid dipping the stuffed casings for 20 seconds in 4% citric acid at about 100°F and then immediately cooking the stuffed casings in a low velocity preheated (250°F dry bulb) smokehouse with a dense smoke during the first ten minutes. The product is then further cooked in the smokehouse and obtains an internal temperature of 160–164°F within 24–25 minutes and is thereupon showered for approximately 10 minutes with cold tap water. After reaching an internal temperature of 85°F the frankfurters are showered with 32°F brine until an internal temperature of 40–45°F is obtained after approximately 15 minutes. The frankfurters are then rinsed briefly by spraying with warm water and peeled at high speed (5000 pounds of frankfurters per hour) by conventional peeling apparatus. Casings coated with a water dispersible saturated fatty acid ester or salt, Examples I–XI and XVI, peel easily and satisfactorily from the encased processed frankfurters, while the untreated control casing and the casings coated with other fatty acid esters do not exhibit satisfactory peeling, in that a large percentage of the frankfurters pass out of the peeling apparatus unpeeled.

Table 1

| Ex. | Fatty Acid Ester or Salt | | Coating on Casing | | | |
|---|---|---|---|---|---|---|
| | Chemical Name | Commercial Name and Source | Total Coating mg/in² | Fatty Acid Ester or Salt mg/in² | Water Solubility* | Peel-** ability |
| I | polyoxyethylene (4) sorbitan monostearate | Tween 61 Atlas Chemical Ind. Inc. | 4.96 | 0.15 | WD | S |
| II | polyoxyethylene (20) sorbitan tristearate | Tween 65 Atlas Chemical Ind. Inc. | 3.72 | 0.11 | WD | S |
| III | glyceryl monostearate | Myverol 18–00 Eastman Kodak Co. | 5.27 | 0.16 | WD | S |
| IV | glyceryl monostearate | Myverol 18–07 Eastman Kodak Co. | 3.41 | 0.10 | WD | S |
| V | succinylated glyceryl monostearate | Myverol SMG Eastman Kodak Co. | 7.75 | 0.23 | WD | S |
| VI | sorbitan monopalmitate | Span 40 Atlas Chemical Ind. Inc. | 3.72 | 0.11 | WD | S |
| VII | sorbitan monostearate | Span 60 Atlas Chemical Ind. Inc. | 3.10 | 0.09 | WD | S |
| VIII | ethoxylated glycerol monostearate | Aldosperse MS-20 Glyco Chemicals Co. Inc. | 3.72 | 0.11 | WD | S |
| IX | propylene glycol monostearate | Kessco Ester Armak Co. | 3.10 | 0.09 | WD | S |
| X | sodium stearate | — | 2.48 | 0.07 | WD | S |
| XI | triglycerol monostearate | Drewpol 3-1-S Drew Chemical Co. | 3.20 | 0.10 | WD | S |
| XII | polyoxyethylene (40) stearate | Myrj 52 Atlas Chemical Ind. Inc. | 3.20 | 0.10 | WS | U |
| XIII | polyoxyethylene (50) stearate | Myrj 53 Atlas Chemical Ind. Inc. | 3.20 | 0.10 | WS | U |

Table 1 *(continued)*

| Ex. | Fatty Acid Ester or Salt: Chemical Name | Fatty Acid Ester or Salt: Commercial Name and Source | Coating on Casing: Total Coating mg/in² | Coating on Casing: Fatty Acid Ester or Salt mg/in² | Water Solubility* | Peel-** ability |
|---|---|---|---|---|---|---|
| XIV | polyoxyethylene (20) sorbitan monopalmitate | Tween 40 Atlas Chemical Ind. Inc. | 3.20 | 0.10 | WS | U |
| XV | ethylene glycol distearate | Emery 3989 Emery Industries Inc. | 3.10 | 0.09 | WN | U |
| XVI | glycerol monolaurate | CPH-12-A-SE C. P. Hall Co. | 3.10 | 0.09 | WD | S |
| XVII | polyoxyethylene (9) monolaurate | Pegosperse 400-MO Glyco Chemicals Inc. | 3.20 | 0.10 | WS | U |
| XVIII | polyoxyethylene (20) sorbitan monooleate | Tween 80 Atlas Chemical Ind. Inc. | 3.10 | 0.09 | WS | U |
| XIX | polyoxyethylene (20) sorbitan trioleate | Tween 85 Atlas Chemical Ind. Inc. | 3.10 | 0.09 | WD | U |
| XX | sorbitan tristearate | Span 65 Atlas Chemical Ind. Inc. | 3.20 | 0.10 | WN | U |
| Control | No coating | — | 0 | 0 | — | U |

*Water solubility of Fatty Acid Ester or Salt:
WS—water soluble
WD—water dispersible
WN—insoluble and non-dispersible

**Peelability of Coated Casing:
S—satisfactory: At least 95% of casings machine peel from frankfurters.
U—unsatisfactory: Less than 95% of casings machine peel from frankfurters.

*EXAMPLES XXI–XXVI*

These examples illustrate that a water dispersible saturated fatty acid ester in varying coating amounts is suitable for providing a food casing which is easily peeled from a food product processed therein.

Coating compositions are prepared using polyoxyethylene (20) sorbitan tristearate ("Tween 65", Atlas Chemical Ind. Inc.), propylene glycol and water at various concentrations by weight of the stearate as outlined in Table 2 below wherein the remainder of the coating admixture was equally divided by weight between propylene glycol and water.

Cellulosic casings are coated and shirred using the method and apparatus of Examples I–XX, but in the amounts of coating composition as indicated in Table 2 below.

The shirred casings are then stuffed and linked into frankfurters with no problems, as in Examples I–XX, are processed in a smokehouse under the conditions set forth in Examples I–XX, and are then peeled at high speed.

The coated test casings of Examples XXII–XXVI peel easily and satisfactorily from the encased processed frankfurters, while the casing of Example XXI and the untreated control casing in Table 2 do not exhibit satisfactory peeling, in that a large percentage of the frankfurters pass out of the peeling apparatus unpeeled.

*TABLE 2*

| Example | Stearate Concentration in Coating Composition wt% | Coating on Casing | |
|---|---|---|---|
| | | Total mg/in² | Stearate mg/in² |
| XXI | 0.5 | 3.10 | 0.02 |
| XXII | 1 | 3.72 | 0.04 |
| XXIII | 1.5 | 3.72 | 0.06 |
| XXIV | 2 | 4.03 | 0.08 |
| XXV | 3 | 4.34 | 0.13 |
| XXVI | 5 | 4.34 | 0.22 |
| Control | no coating | 0 | 0 |

*EXAMPLES XXVII–XXVIII*

These examples illustrate that a water dispersible saturated fatty acid ester in admixture with mineral oil, propylene glycol and water is suitable for providing a food casing which is easily peeled from a food product processed therein.

Coating compositions are prepared from a water dispersible stearate or palmitate as indicated in Table 3 below, using the following proportions of ingredients:

| | |
|---|---|
| Water dispersible stearate or palmitate | 5 wt% |
| Mineral oil | 5 wt% |
| Propylene glycol | 45 wt% |
| Water | 45 wt% |

Cellulosic casings are coated and shirred using the method and apparatus of Examples I–XX, but in the amounts of the above coating compositions as indicated in Table 3 below.

The shirred casings are then stuffed and linked into frankfurters with no problems, as in Examples I–XX, are processed in a smokehouse under the conditions set forth in Examples I–XX and are then peeled at high speed.

The coated test casings of Examples XXVII–XXVIII, peel easily and satisfactorily from the encased processed frankfurters, while the untreated control casing in Table 3 does not exhibit satisfactory peeling, in that a high percentage of the frankfurters pass out of the peeling apparatus unpeeled.

*TABLE 3*

| Example | Coating on Casing: Water Dispersible Stearate or Palmitate | Total Coating mg/in² | Water Dispersible Stearate mg |
|---|---|---|---|
| XXVII | Polyoxyethylene (20) sorbitan tristearate ("Tween 65") | 3.5 | 0.18 |
| XXVIII | Sorbitan monostearate ("Span 60") | 3.5 | 0.18 |
| Control | No coating | 0 | 0 |

*EX*

This illustrates that dispersible saturated fatty acid ester in water alone and not in mixture with any other materials, is suitable for providing a food casing which is easily peelable from a food product processed therein.

Polyoxyethylene (20) sorbitan tristearate ("Tween 65", Atlas Chemical Ind. Inc.), is dispersed in water and then slugged onto the internal surface of a cellulosic frankfurter size casing. The water is absorbed into the cellulose leaving a waxy coating of about 0.35 mg/in² of the tristearate on the surface of the casing, which is then stuffed with a frankfurter emulsion, and further processed as disclosed in the Examples I–XX, and is then peeled at high speed. The casing coated with the stearate peels easily, while an uncoated control casing similarly stuffed and processed does not exhibit satisfactory peeling in that a high percentage of the frankfurters pass out of the peeling apparatus unpeeled.

Although the present invention has been described and set forth in some detail, it should be further understood that the same is susceptible of changes, modifications and variations without departing from the scope and spirit of the invention.

CLAIMS

1. A tubular cellulosic casing having a coating over the internal surface thereof, said coating comprising a water dispersible saturated fatty acid ester or salt whereby said casing is suitable for stuffing with food products and is readily peelable from food products processed therein.

2. A casing as claimed in claim 1 wherein said water dispersible saturated fatty acid ester or salt is present in an amount of at least 0.04 mg/in² (0.0062 mg/cm²) of internal casing surface.

3. A casing as claimed in claim 2 wherein said water dispersible saturated fatty acid ester or salt is present in an amount of from 0.04 mg/in² (0.0062 mg/cm²) to 0.40 mg/in² (0.062 mg/cm²) of internal casing surface.

4. A casing as claimed in any one of claims 1 to 3 wherein said water dispersible saturated fatty acid ester or salt is selected from polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan tristearate, glyceryl monostearate, succinylated glyceryl monostearate, sorbitan monopalmitate, sorbitan monostearate, ethoxylated glycerol monostearate, propylene glycol monostearate, triglycerol monostearate, glycerol monolaurate, sodium stearate, sodium palmitate, potassium stearate, and mixtures thereof.

5. A casing as claimed in claim 4 wherein said water dispersible saturated fatty acid ester is polyoxyethylene (20) sorbitan tristearate.

6. A casing as claimed in any one of claims 1 to 5 wherein said casing together with said coating has a total humectant content of at least about 15 weight percent based upon the total weight of said casing together with said coating.

7. A casing as claimed in claim 6 wherein said humectant is selected from glycerol, propylene glycol, triethylene glycol, sorbitol, and mixtures thereof.

8. A casing as claimed in claim 7 wherein said humectant is a mixture of propylene glycol and glycerol.

9. A casing as claimed in any one of claims 6 to 8 wherein said coating additionally comprises a lubricant.

10. A casing as claimed in claim 9 wherein said lubricant is present in an amount of no more than 6 mg lubricant per sq inch (0.9 3mg/cm²) of internal casing surface.

11. A casing as claimed in claim 9 or claim 10 wherein said lubricant is selected from an animal fat, a vegetabl oil, a mineral oil and a silicon oil.

12. A casing as claimed in claim 11 wherein said lubricant is a mineral oil.

13. A method of preparing a tubular cellulosic food casing that is readily peelable from food products encased and processed therein, which comprises the step of applying to the internal surface of said casing a coating composition comprising a water dispersible saturated fatty acid ester or salt.

14. A method as claimed in claim 13 wherein said water dispersible saturated fatty acid ester or salt is applied in an amount of at least 0.04 mg/in² (0.0062 mg/cm²) of internal surface of said casing.

15. A method as claimed in claim 14 wherein from 0.04 mg/in² (0.0062 mg/cm²) to 0.40 mg/in² (0.062 mg/cm²) or said water dispersible saturated fatty acid ester of salt is applied to the internal surface of said casing.

16. A method as claimed in any one of claims 13 to 15 wherein not more than 7.0 mg of said coating composition is applied per square inch (not more than 1.094 mg/cm²) of said internal surface of said casing.

17. A method as claimed in any one of claims 13 to 16 wherein said water dispersible saturated fatty acid ester or salt is selected from polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan tristearate, glyceryl monostearate, succinylated glyceryl monostearate, sorbitan monopalmitate, sorbitan monostearate, ethoxylated glycerol monostearate, propylene glycol monostearate, triglycerol monostearate, glycerol monolaurate, sodium stearate, sodium palmitate, potassium stearate, and mixtures thereof.

18. A method as claimed in claim 17 wherein said water dispersible saturated fatty acid ester is polyoxyethylene (20) sorbitan tristearate.

19. A method as claimed in any one of claims 13 to 18 wherein said coating composition comprises water, humectant, and at least 1.0% by weight of said water dispersible saturated fatty acid ester or salt.

20. A method as claimed in claim 19 wherein said coating composition is a dispersion of the water dispersible saturated fatty acid ester or salt.

21. A method as claimed in claim 19 or claim 20 wherein not more than 2.8 mg/in² (0.43 mg/cm²) of said water is applied to the internal surface of said casing.

22. A method as claimed in any one of claims 19 to 21 wherein the humectant is present in the coating composition in a weight ratio of said humectant to said water of at least 0.15 to 1.0.

23. A method as claimed in claim 22 wherein the humectant is present in the coating composition in a weight ratio of humectant to water of at least 0.15 to 1.0.

24. A method as claimed in any one of claims 19 to 23 wherein said humectant is selected from glycerol, propylene glycol, triethylene glycol, sorbitol, and mixtures thereof.

25. A method as claimed in claim 24 wherein said humectant is propylene glycol.

26. A method as claimed in any one of claims 19 to 25 wherein said coating composition additionally comprises a lubricant.

27. A method as claimed in claim 26 wherein said lubricant is selected from an animal fat, a vegetable oil, a mineral oil, and a silicone oil.

28. A method as claimed in claim 27 wherein said lubricant is a mineral oil.

29. A method as claimed in any one of claims 13 to 28 wherein said coating composition is applied to the internal surface of said casing by spraying said coating composition through a hollow shirring mandrel just in advance of shirring of the casing.

30. A method as claimed in any one of claims 13 to 28 wherein the coating composition is applied to the internal surface of the casing in the form of a slug of liquid inserted into the casing which coats the casing as the casing is moved past the slug of coating liquid.

31. A tubular cellulosic casing as claimed in claim 1 and substantially as hereinbefore described with reference to any one of the Examples.

32. A method as claimed in claim 13 and substantially as hereinbefore described with reference to any one of the Examples.

33. A tubular cellulosic food casing whenever prepared by a process as claimed in any one of claims 13 to 30 or 32.

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